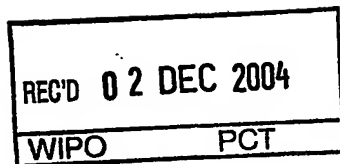




INVESTOR IN PEOPLE

The Patent Office  
 Concept House  
 Cardiff Road  
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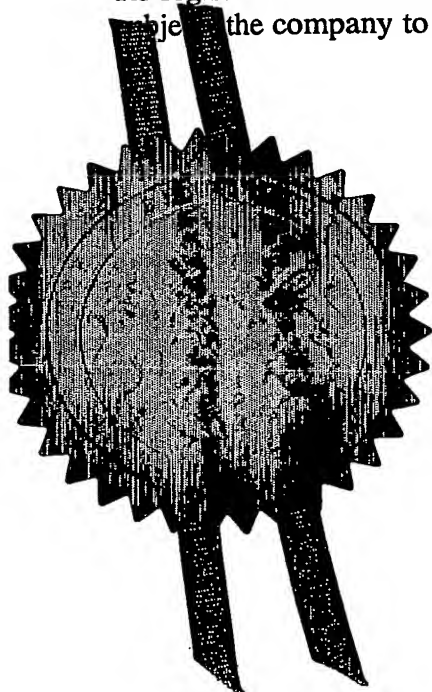
EP04/12155

I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation & Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein.

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Signed *AmBrewster*

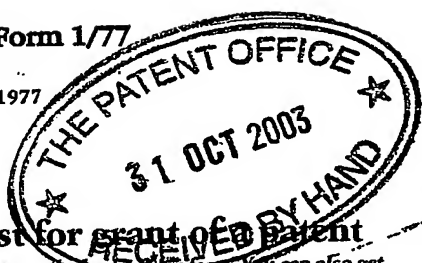
Dated 25 October 2004

**PRIORITY  
 DOCUMENT**

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Patents Form 1/77

Patents Act 1977  
(Rule 16)



1 03NOV03 EB48891-5 D00389  
P01/7700 0.00-0325540.3

# Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

The Patent Office

Cardiff Road  
Newport  
South Wales  
NP10 8QQ

1. Your reference

P18166GB - NHF/szl

2. Patent application number

(The Patent Office will fill this part in)

31 OCT 2003

0325540.3

3. Full name, address and postcode of the or of each applicant (underline all surnames)

Autotoliv Development AB,  
S-447 83 VARGARDA,  
Sweden.

Patents ADP number (if you know it)

08744872001

If the applicant is a corporate body, give the country/state of its incorporation

SWEDEN

4. Title of the invention

IMPROVEMENTS IN OR RELATING TO AN AIR-BAG ARRANGEMENT

5. Name of your agent (if you have one)

Forrester Ketley & Co.

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

Forrester House  
52 Bounds Green Road  
London  
N11 2EY

Patents ADP number (if you know it)

133001

6. Priority: Complete this section if you are declaring priority from one or more earlier patent applications, filed in the last 12 months.

Country

Priority application number  
(if you know it)

Date of filing  
(day / month / year)

7. Divisionals, etc: Complete this section only if this application is a divisional application or resulted from an entitlement dispute (see note f)

Number of earlier UK application

Date of filing  
(day / month / year)

8. Is a Patents Form 7/77 (Statement of inventorship and of right to grant of a patent) required in support of this request?

Answer YES if:

- a) any applicant named in part 3 is not an inventor, or
- b) there is an inventor who is not named as an applicant, or
- c) any named applicant is a corporate body.

YES

Otherwise answer NO (See note d)

## Patents Form 1/77

9. Accompanying documents: A patent application must include a description of the invention. Not counting duplicates, please enter the number of pages of each item accompanying this form:

Continuation sheets of this form -

Description 10 ✓

Claim(s) 3 ✓

Abstract 1 ✓ *wm*

Drawing(s) 1 + 1 ✓

10. If you are also filing any of the following, state how many against each item.

Priority documents -

Translations of priority documents -

Statement of inventorship and right to grant of a patent (Patents Form 7/77) 1 ✓

Request for a preliminary examination and search (Patents Form 9/77) 1 ✓

Request for a substantive examination (Patents Form 10/77) -

Any other documents (please specify) -

11. I/We request the grant of a patent on the basis of this application.

Signature(s) *Forrester Ketley & Co.*  
Forrester Ketley & Co.

Date 30 October, 2003

12. Name, daytime telephone number and

e-mail address, if any, of person to contact in the United Kingdom

FRANKLAND, Nigel H.  
(020) 8889 6622

fkldon@forresters.co.uk

### Warning

After an application for a patent has been filed, the Comptroller of the Patent Office will consider whether publication or communication of the invention should be prohibited or restricted under Section 22 of the Patents Act 1977. You will be informed if it is necessary to prohibit or restrict your invention in this way. Furthermore, if you live in the United Kingdom, Section 23 of the Patents Act 1977 stops you from applying for a patent abroad without first getting written permission from the Patent Office unless an application has been filed at least 6 weeks beforehand in the United Kingdom for a patent for the same invention and either no direction prohibiting publication or communication has been given, or any such direction has been revoked.

### Notes

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- Write your answers in capital letters using black ink or you may type them.
- If there is not enough space for all the relevant details on any part of this form, please continue on a separate sheet of paper and write "see continuation sheet" in the relevant part(s). Any continuation sheet should be attached to this form.
- If you have answered YES in part 8, a Patents Form 7/77 will need to be filed.
- Once you have filled in the form you must remember to sign and date it.
- Part 7 should only be completed when a divisional application is being made under section 15(4), or when an application is being made under section 8(3), 12(6) or 37(4) following an entitlement dispute. By completing part 7 you are requesting that this application takes the same filing date as an earlier UK application. If you want the new application to have the same priority date(s) as the earlier UK application, you should also complete part 6 with the priority details.

DUPLICATE

PATENTS ACT 1977

P18166GB-NF/jsd

5 DESCRIPTION OF INVENTION

**"IMPROVEMENTS IN OR RELATING TO AN AIR-BAG  
ARRANGEMENT"**

10

**THE PRESENT INVENTION** relates to an air-bag arrangement, and more particularly relates to an air-bag arrangement in the form of an inflatable curtain.

15

It has been proposed previously to provide an air-bag in the form of a so-called "inflatable curtain". An air-bag of this type is intended to be mounted in the roof of a motor vehicle and, on inflation, is intended to lie adjacent the side windows of the vehicle, thus constituting a "curtain" in order to provide protection for the head of an occupant of the vehicle. A side curtain of this type may be of substantial advantage in the event of a side impact or roll-over situation.

20

Many proposals have been made in connection with such inflatable curtains.

25

WO 02/085674 A2 shows an inflatable curtain and shows a specific method for folding the curtain. The curtain is folded by using a rolling technique which rolls the curtain about an axis which, in use of the curtain, is

substantially horizontal, a terminal part of the curtain then being folded to extend generally upwardly above the roll. The folded curtain is mounted in position by using this upwardly directed portion.

- 5        On deployment of the air-bag, the air-bag effectively unrolls to lie adjacent a side window of the vehicle.

The disadvantage with the arrangement of WO 02/085674 A2 is that it involves a rolling technique and also a folding technique, meaning that  
10       apparatus must be provided to effect the rolling technique and separate apparatus must be provided to effect the folding technique.

The present invention seeks to provide an improved air-bag arrangement.

15

According to the present invention, there is provided an air-bag arrangement, the air-bag arrangement incorporating an inflatable curtain, the inflatable curtain being rolled to form a roll, part of the inflatable curtain that is to form the upper-most edge of the inflatable curtain when inflated extending  
20       downwardly from the roll to lie adjacent a side part of a motor vehicle on which the inflatable curtain is to be mounted.

Preferably, the part of the inflatable curtain extending downwardly from the roll is a substantially uninflatable region provided with one or more  
25       mounting formations.

Advantageously, the mounting formations comprise a plurality of mounting tabs to be connected to mounting lugs.

Conveniently, the mounting formations comprise a plurality of mounting apertures to engage bolts, Christmas tree snap connectors or the like.

Preferably, the air-bag is associated with a mounting bracket.

5

Advantageously, the mounting bracket incorporates an open topped channel dimensioned to receive part of the downwardly-extending part of the air-bag.

10

Conveniently, the side-walls of the channel are provided with co-aligned apertures to be co-aligned with the mounting apertures formed in the air-bag, to enable mounting elements in the form of bolts, Christmas tree snap connectors or the like to pass through the co-aligned apertures to mount the bracket and thus the inflatable curtain to a motor vehicle.

15

Preferably, the bracket incorporates a plurality of hooks.

Advantageously, the hooks are provided at a position above the open-topped channel to engage apertures provided in a side-wall of a motor vehicle.

20

Conveniently, the bracket includes a supporting platform to support the rolled air-bag.

Preferably, the rolled air-bag is contained within a protective cover.

25

Advantageously, the protective cover comprises a sleeve provided with a breakable seam.

Conveniently, the air-bag is rolled towards the outboard side of the air-bag.

Preferably, the air-bag incorporates a gas flow duct, the gas flow duct,  
5 when the air-bag is rolled, being provided at the top part of the roll.

Advantageously, the or each mounting formation is located at a position which is not above the upper-most part of the roll, and may be located completely below the roll.

10

In order that the invention may already be understood, and so that further features thereof may be appreciated, embodiments of the invention will now be described, by way of example, with reference to the accompanying drawings in which:

15

FIGURE 1 is a diagrammatic sectional view of part of an air-bag arrangement in accordance with the invention,

FIGURE 2 is a view corresponding to Figure 1 showing a modified  
20 embodiment of the invention, and

FIGURE 3 is a view corresponding to Figures 1 and 2 showing a further modified embodiment of the invention.

25 Here it is to be understood that a typical inflatable curtain, as in general use, is provided, adjacent its upper-most edge, with a plurality of mounting lugs or equivalent fixing devices to secure the upper edge of the inflatable curtain to the part of the roof of a motor vehicle which extends above the side door openings and/or side windows of the vehicle. The inflatable curtain may

extend the whole length of the vehicle cabin or only part of the length of the vehicle cabin.

Typically, adjacent the upper edge of the inflatable curtain, a gas flow duct is provided which extends across the whole length of the inflatable curtain. Below the gas flow duct are a plurality of inflatable cells or chambers, and some of the inflatable cells or chambers may be separated by uninflatable regions.

There are many different detailed designs of inflatable curtain, and the present invention is not related to any specific design.

Figure 1 illustrates an air-bag 1 in the form of an inflatable curtain which is in a rolled condition. The edge 2 of the inflatable curtain which forms the upper-most or top edge when the inflatable curtain is inflated is shown emerging from a generally spiral-wound roll 3, with the edge 2 being directed so as to extend downwardly. Adjacent the edge 2 the air-bag 1 is provided with a mounting formation in the form of a tab 4. The rolled air-bag is shown immediately adjacent part S of the side of a motor vehicle, and a mounting lug L is shown provided on the side part S of the motor vehicle for co-operation with the mounting tab 4 to secure the air-bag 1 to the vehicle.

The part of the side curtain extending upwardly from the edge 2 and adjacent the mounting tab 4 forms an uninflatable region 5. Immediately adjacent the uninflatable region 5 is a region of the inflatable curtain that forms a transversely extending gas flow duct 6. The gas flow duct 6 is defined between two sheets of fabric that have been connected together to form the inflatable curtain. In an alternative embodiment the gas flow duct may be a separate tube, which is separate from the main part of the inflatable curtain.



The tube may be of plastic, textile or metal. The sheets of fabric may be sewn together but typically are formed simultaneously using a one-piece weaving process which is known *per se*. The two sheets of fabric are shown woven together to form a seam 7 that defines the lower-most edge of the gas flow duct 6. It is to be observed that the gas flow duct 6 extends across the top most part of the roll 3. The roll continues concentrically inwards, the lower-most or bottom edge 8 of the inflatable curtain being located at the centre of the roll. It is to be understood that the region between the seam 7 and the lower-most edge 8 is provided with the above-mentioned cells or chambers. The cells or chambers, when inflated, constitute a passenger protecting area.

Here it is to be understood that the roll 3, in this embodiment, has been formed by rolling the lower-most edge of the inflatable curtain towards the side of the inflatable curtain which, when the inflatable curtain is inflated, constitutes the "outboard" side of the inflatable curtain. The roll may be accomplished using any convenient form of rolling apparatus.

It is to be appreciated that the inflatable curtain of Figure 1 will be contained within an appropriate package, such as a fabric sleeve or a housing surrounding the roll 3, but the package is not shown at this stage for the sake of clarity.

In the event that the inflatable curtain is to be inflated, in an accident situation, gas is initially supplied to the gas flow duct 6 from a gas generator (not shown). The gas flow duct 6 thus becomes inflated, at least along part of the length of the gas flow duct. Since the gas flow duct extends across the top of the roll 3, inflation of the gas flow duct will tend to drive the rest of the roll 3 downwardly. Consequently a downward motion is imparted to the main part of the inflatable curtain. This facilitates the ready inflation of the inflatable

curtain so that it occupies a fully deployed state within a very few micro seconds of deployment being instigated.

As the inflatable curtain becomes deployed, so the roll 3 will unroll.  
5 Because the roll has been rolled "towards" the outboard sides of the inflatable curtain, the inflatable curtain will unroll in such a way that the main body of the roll tends to be driven towards the adjacent window or side part S of the vehicle. The inflating side curtain will therefore tend to insinuate itself  
10 between the head of a seat occupant within the vehicle and the adjacent side of the vehicle, even if the head of the occupant is resting lightly against the window or side of the vehicle, for example, if the seat occupant is sleeping. It is to be understood that it would be possible, if the air-bag unrolled in the opposite sense, for the air-bag to ride over the head of a vehicle occupant if the head of the occupant were lying adjacent the window, with the head of the  
15 occupant thus becoming trapped between the air-bag and the window. This is clearly undesirable.

Figure 1 illustrates a very simple embodiment of the invention. Figure 2 illustrates a rather more practical embodiment of the invention. In this  
20 embodiment, the roll 3 described above has been compressed so as to have an oval or more rectangular shape, so that the roll is less obtrusive in the roof-lining of the vehicle. The roll has been surrounded by a textile cover 9 in the form of a sleeve, which has a breakable tape seam 10. The tape seam 10 is intended to rupture on instigation of deployment of the air-bag. Alternatively  
25 the textile cover could have a tear line, such as a perforation, or some other line of mechanical weakness.

In this embodiment of the invention the uninflatable region 5 adjacent the upper-most edge 2 of the inflatable curtain is provided with a mounting

aperture 11, and the free edge 2 is received within a channel or slot 12 formed in a mounting bracket 13. The slot 12 is an upwardly open channel. The mounting bracket 13 incorporates a supporting platform portion 14 which extends beneath the roll 3 to support the roll, and a mounting bolt 15 is provided which extends through co-aligned apertures formed in opposite sides of the channel 12 and which also passes through the mounting aperture 11 formed in the uninflatable region 5 of the inflatable curtain. The bolt 15 may be received within an appropriate threaded mount 16 formed in the side part S of the vehicle, to secure the air-bag to the motor vehicle.

It is therefore to be noted that in both the embodiment of Figure 1 and the embodiment of Figure 2 the air-bag is mounted in position within the vehicle by co-operating mounting formations which are located separately beneath the main body of the roll 3.

Figure 3 illustrates an embodiment which is similar to that of Figure 2, save that the mounting bracket 13 comprises an additional upwardly extending finger or flange 17 which extends upwardly from the channel 12 to a position slightly above the mid-point of the roll 3 on the outboard side of the roll 3. The finger 17 terminates with a downwardly-turned hook 18 shown engaged with an aperture 19 formed in the side part S of the vehicle. The hook 18 is provided at a position close to the channel 12. In the embodiment of Figure 3 the bolt 15 has been replaced by a "Christmas tree" snap connector 20.

It is to be appreciated that in mounting the embodiment of Figure 3 in position in a motor vehicle, initially the hook 18 will be engaged with the aperture 19 and subsequently the Christmas tree fastener 20 will be engaged with the co-operating mounting 16 formed in the side part S of the vehicle.

Of course, in each embodiment described above, a plurality of mounting configurations will be provided spaced along the length of the inflatable curtain. Thus in the embodiment of Figure 1 there will be a plurality of attachment tabs 4 and co-operating attachment lugs 6. In the embodiment of Figure 2 there will be a plurality of bolts 15 and in the embodiment of Figure 3 there will be a plurality of Christmas tree snap connectors 20 and a plurality of hooks 18.

10 In each of the described embodiments, the roll is mounted in position in the motor vehicle by means of one or more mounting arrangements, the mounting arrangements all being located at a level which is not above the top-most part of the roll. In the preferred embodiments, the mounting arrangements include at least one mounting arrangement located beneath the lower-most part  
15 of the roll.

In the described preferred embodiments of the invention the roll is located above the mounting arrangement. This has the advantage that there is usually more space available in an upper portion of the roof frame, rather than the lower portion, and thus at least most of the packaged inflatable curtain is  
20 located in part of the roof where there is ample space to accommodate it.

It is to be understood that the invention provides the advantage that the inflatable curtain can be simply rolled and packaged, and there is therefore no requirement for a folding apparatus to be provided in addition to the rolling  
25 apparatus to facilitate packaging of the inflatable curtain.

In the present Specification "comprises" means "includes or consists of" and "comprising" means "including or consisting of".

The features disclosed in the foregoing description, or the following Claims, or the accompanying drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process  
5 for attaining the disclosed result, as appropriate, may, separately, or in any combination of such features, be utilised for realising the invention in diverse forms thereof.

## CLAIMS:

1. An air-bag arrangement; the air-bag arrangement incorporating an  
5 inflatable curtain, the inflatable curtain being rolled to form a roll, part of the  
inflatable curtain that is to form the upper-most edge of the inflatable curtain  
when inflated extending downwardly from the roll to lie adjacent a side part of  
a motor vehicle on which the inflatable curtain is to be mounted.
- 10 2. An air-bag arrangement according to Claim 1 wherein the part of the  
inflatable curtain extending downwardly from the roll is a substantially  
uninflatable region provided with one or more mounting formations.
3. An air-bag arrangement according to Claim 2 wherein the mounting  
15 formations comprise a plurality of mounting tabs to be connected to mounting  
lugs.
4. An air-bag arrangement according to Claim 2 wherein the mounting  
formations comprise a plurality of mounting apertures to engage bolts,  
20 Christmas tree snap connectors or the like.
5. An arrangement according to Claim 4 wherein the air-bag is associated  
with a mounting bracket.
- 25 6. An air-bag arrangement according to Claim 5 wherein the mounting  
bracket incorporates an open topped channel dimensioned to receive part of the  
downwardly-extending part of the air-bag.

7. An air-bag arrangement according to Claim 6 wherein the side-walls of the channel are provided with co-aligned apertures to be co-aligned with the mounting apertures formed in the air-bag, to enable mounting elements in the form of bolts, Christmas tree snap connectors or the like to pass through the co-aligned apertures to mount the bracket and thus the inflatable curtain to a motor vehicle.
8. An air-bag arrangement according to any one of Claims 5, 6 or 7 wherein the bracket incorporates a plurality of hooks.
9. An air-bag arrangement according to Claim 8 wherein the hooks are provided at a position above the open-topped channel to engage apertures provided in a side-wall of a motor vehicle.
10. An air-bag arrangement according to any one of Claims 5 to 9 wherein the bracket includes a supporting platform to support the rolled air-bag.
11. An air-bag arrangement according to any one of the preceding Claims wherein the rolled air-bag is contained within a protective cover.
12. An air-bag arrangement according to Claim 11 wherein the protective cover comprises a sleeve provided with a breakable seam.
13. An air-bag arrangement according to any one of the preceding Claims wherein the air-bag is rolled towards the outboard side of the air-bag.
14. An air-bag arrangement according to any one of the preceding Claims wherein the air-bag incorporates a gas flow duct, the gas flow duct, when the air-bag is rolled, being provided at the top part of the roll.

15. An air-bag according to any one of the preceding Claims wherein the or each mounting formation is located at a position which is not above the uppermost part of the roll.

5

16. An air-bag according to Claim 15 wherein the or each mounting formation is located below the roll.

17. An air-bag arrangement substantially as herein described with reference to and as shown in Figure 1 of the accompanying drawings.

10

18. An air-bag arrangement substantially as herein before described with reference to and as shown in Figure 2 of the accompanying drawings.

19. An air-bag arrangement substantially as herein described with reference to and as shown in Figure 3 of the accompanying drawings.

15

20. Any novel feature or combination of features disclosed herein.



**ABSTRACT****5 "IMPROVEMENTS IN OR RELATING TO AN AIR-BAG  
ARRANGEMENT"**

10 An air-bag incorporates an inflatable curtain (1) rolled to form roll (7). Part (5) of the inflatable curtain that is to form the uppermost edge (2) of the inflatable curtain when inflated initially extends downwardly from the roll to lie adjacent a side part S on motor vehicle on which the inflatable curtain is to be mounted.



